

**Canal Era Industrialization:
Canada, 1791-1840**

Robin Neill
University of Prince Edward Island
and Carleton University
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The Industrial Revolution

According to traditional wisdom, the “First Industrial Revolution” occurred in Britain sometime between 1750 and 1850. Recent scholarship, however, has failed to find a measurable beginning and end by which such a revolution might be dated. Still, it is possible to chronicle an upsurge in the construction of canals, in Britain, the United States, and Canada in the late eighteenth century, and to approximate a closure of an era when, after 1850, in all three countries steam locomotives and railroads replaced canals as the important inland transportation investment frontier. So, whether there was an Industrial Revolution or not, there was a Canal Era during which some kind of industrialization occurred.

There were events during the Canal Era that prompted historians to refer to it as a time of industrial revolution. There were changes in living standards, in forms of employment, in the dispersion of population, in the placement of investment, and the like. These events, however have been found not to exhibit the simultaneous, sudden, large change that normally would be associated with a revolution. Rather, in the more recent view, the Canal Era was marked by a gradual maturing of technological and institutional phenomena that had roots well back in the previous century. What was sudden was the realization that these events were taking place. The revolution, insofar as it was a revolution, was one of consciousness. It was the arrival of a new information environment. What made it “industrial” was the extent to which the new climate of opinion was related to science and the industrial arts. A newly self-conscious *mentality* was gradually embodying itself in human and physical capital (*Mokyr, 1999, pp. 75-81*).

The “First Industrial Revolution” in Britain

T.S. Ashton, writing in the 1950s, described the technological and institutional base of the first industrial revolution as phenomena advancing slowly

and evenly prior to and during the 1760-1830 period (Ashton, 1958). He described a suddenly emerging mentality associated with industrial change, but the change itself he said was gradual. “Even in the middle of the nineteenth century”, he wrote, “not more than half of the Yorkshire textile workers, and still less of those of the West Country, had been brought into factories” (Ashton, 1958, p. 75). “There is no evidence”, he wrote, “of any mass exodus from the countryside” (Ashton, 1958, p. 125).

Still, Ashton’s account was not consistently in line with more recent scholarship. At its end he listed increases in capital, a rural urban shift, and increases in other macroeconomic variables as constituting the revolution, and early in his account he stated that the industrial revolution was “the conjuncture of growing supplies of land, labor, and capital.” (Ashton, 1958, p. 21). In one place he wrote, “The industrial revolution is to be thought of as a movement not a period of time”, but in another, he wrote, “Whether in England after 1760, in the United States and Germany after 1870, or in Canada and Russia in our own day, its character and effects are fundamentally the same” (Ashton, 1958, p. 142). Ashton is not alone in his reluctance to expunge an entrenched perception. Even Joel Mokyr ended his 1999 summary of recently published evidence against the traditional, quantitative, time and place defined industrial revolution with the self contradictory remark that “Britain taught Europe and Europe taught the world” (p. 127).

Given confusion with respect to the rate of quantitative change in industry, dating is uncertain. For this reason dates bracketing the Canal Era: 1750-1850, 1775-1830, or, in the case of Canada, 1791-1840, are useful only as fuzzy boundaries. Rather than time limits of a revolution, they are time limits of enquiry, making possible a bounded description of industrial development. This is not to say that the building of the canals was not both a consequence and a cause of economic change. It simply grounds the question, “What happen in Euro-American industry during the Canal Era?”

Although the informational environment view of the first industrial revolution in Britain has not become pervasive in the literature on the subject, elements of it have been appearing in comparisons of economic development in Britain and America for some time. In his 1967 classic, *American and British Technology in the Nineteenth Century*, H.J. Habakkuk demonstrated that technological advance in America paralleled, and at times surpassed that in Britain. In 1981, D.S. Jeremy pointed out that, because the information environment was Anglo-American, advances in textile production occurred in Britain and the United States at the same time. In contributions to the more recent scholarship, Sokoloff and Dollar (1997) have produced evidence that the factory system caught on faster in the United States than in Britain; and Mark Egnal (1998) has reconstructed colonial history with most economic activity advancing *pari passus* in America and Britain. In this view, in

America, as in continental Europe, and between America, Britain, and the Continent, differences in the character of economic activity were accidental consequences of different local conditions and of the global division of labor, not of the presence or non-presence of the revolution.

The Implications for Canada

In the light of this more recent view of the nature of Euro-American economic development, the Canal Era economy in Canada takes on a different character (1). To describe this character it is necessary to make a distinction between an economy characterized by the consequences of a certain information environment, and an economy characterized by a particular specialization of activity. Two economies sharing the same information environment may have different activities, one farming, the other manufacturing, depending on their comparative advantages. Similarly, a single economy experiencing an industrializing information environment, such as Britain in the Canal Era, could have both farmers and manufacturers advancing within and because of the same increasingly scientific climate of opinion. In this view, then, Canada may have depended more on primary product exports than some other parts of the Euro-American economy, but its dependence occurred inside a common, informationally revolutionizing economy. Specialization in primary product exports, to the extent that it occurred in Canada, was a secondary aspect of a wider and more substantial phenomenon (2).

This view of things may be addressed more broadly by a question. Was ‘the First Industrial Revolution’ an economically significant informational phenomenon of the Euro-American economy, appearing with substantially the same consequences everywhere in that economy at about the same time?

The answer to this question is “yes”; but this, too, requires some conceptual explanation prior to any presentation of observed events. There is a difference between the arrival of an epistemic revolution in some place, and the arrival in some place of people carrying such a revolution. The Canadian economy did not experience a revolutionary development, rather, the revolution arrived fully developed; or the fate of Canada’s aboriginals would not have been what it was. Indeed, this is what one would expect, and what we have been told. Harold Innis repeatedly stated that the frontier expanded only by means of the most advanced technologies and institutions. Improvements in transportation and new corporate forms emerging in the European economy made the frontier in America possible. Norman Gras added that the improvements defined the frontier. Frontier? Yes, but, frontier of what?

Through a Distorting Lense

Certainly there are authorities, unquestionable on other grounds, who deny the presence of the first industrial revolution in Canada. “Throughout this period

[1820 -1850], according to Jacob Spelt (1972, p. 74), “manufacturing remained a village handicraft in small workshops”. ... “In a word, manufacturing in the modern meaning of the word was almost non existent”. “Modern manufacturing”, according to Spelt, arrived in South Central Ontario between 1881 and 1911 (p. 150).

There are two principal problems with Spelt’s account of the Canal Era in central Canada. First, it does not describe the general nature of industrialization in the era, wherever it occurred, and, consequently, it does not explicitly compare Canadian industrialization with industrialization in other places. “Modern manufacturing”, as Spelt calls it, did not arrive in Britain, or the United States either, until the late nineteenth century. In short, the lag in Canadian economic development implied in Spelt’s account is based on a misconception. Second, Spelt defined his area of interest to exclude Hamilton, the Ottawa Valley, and Montreal. Not only did this sap the base of his considerations, but it allowed Toronto to dominate and bias his account. Industrialization was not especially a phenomenon of the larger commercial centers in either Britain or in Canada.

Spelt is not alone in this misconception. His view, unexamined, pervades the histories of the region. As late as 2000, John McNairn, citing none other than Douglas McCalla (1993), wrote,

Upper Canada remained a pre-industrial society under going a process of settlement that, despite impressive growth and important exceptions, continued to see itself predominantly as home to small, petty producers concerned with the ongoing struggle for family independence (McNairn, 2000, p. 18).

Misconception of the nature of the first industrial revolution underlies such an account. In fact, McNairn exposes the weaknesses in this depiction of the province even as he repeats it (See below, “*The Information Environment*”).

There is evidence to correct this misconception. Between 1790 and 1840, the rate of growth of total output in Britain was about 2% (Mokyr, 1999, p. 11). Accepting Canada’s nominal output to have been \$ 169 million in 1850 (Marr and Paterson, 1980, p. 6), and that the Canada in question was planted about 1790, the Canadian rate of growth was about 10%. As late as 1851, only 27% of the British labor force worked in industries directly affected by the industrial revolution (Mokyr, p. 16). In 1851 the Canadian workforce was composed of 20% skilled trades, 38% labor, and 42% farming, with some 10% of the skilled tradesmen working in what then passed for factories (McCalla, 1993, p. 104). Apparently, then, if Canada was a “pre-industrial society”, so also may Britain have been. Between 1760 and 1820, living standards in Britain stagnated, and though they rose thereafter (Mokyr, 1999, p. 117-119) the period 1820-1837 was one of heavy migration from Britain to Upper

Canada; so at least some in Britain expected to be better off in Canada. There were some ways, then, in which the improving effects of the industrial revolution were felt more in Canada than in Britain.

The evidence is only suggestive, but it can be multiplied. As late as 1840, only 10% of the British work force was employed in factories, and only 30% was in manufacturing (Fores, 192). In Britain, "... water wheels were far more numerous [than steam engines] well into the nineteenth century. They were, in fact, the dominant power unit from 1775 through 1830, and reached their peak of efficiency about 1870." (Cameron, 1985, pp. 5-6). In these matters, the advance in Britain was about the same as that in continental Europe; the pattern differing in Europe only because of local circumstances, such as different available resources or the occurrence of debilitating political turmoil. In general, the differences between Britain and the Continent were differences in accidentals, not of timing nor of the general nature of the phenomenon in question -- which was informational, rather than physical. (Cameron, 1985. Mikulas and Potter, 1996). The same can be said of the differences between Britain and the Montreal-Upper Canada economy.

Canal Era Industrialization in Canada

With the building of canals setting the time boundaries for an account of industrialization in Canada, the spatial span of attention is from Chambly on the Richelieu River in Lower Canada, to Brantford at the western end of the Grand River in Upper Canada, or perhaps to Long Point on Lake Erie. Not far from the Grand River Canal, running from Brantford to Lake Eire, Long Point was the location of the Normandale iron works. Although building canals on the waterway between Brantford and Chambly began in a small way before the American War of Independence, the Canal Era in Canada dates from the Constitution Act of 1791. That marked the sudden arrival of an Anglo-American population, and the beginning of an upswing in canal building activity.

The beginning in 1791 does not indicate a substantial difference between developments in Britain and America. The Canal Era in Britain began with the building of the Newry Canal in 1742, peaked between 1790 and 1814, but slowed thereafter, when overbuilding became an occasion for increased government regulation. The Canal Era in the United States and Canada occurred later, but at the same time in both countries. The Lachine Canal at Montreal was commissioned in 1815 though not completed until 1824. The Erie Canal between Albany, on the Hudson River, and Buffalo, on Lake Erie, was opened in 1825. The Welland Canal, between Lake Erie and Lake Ontario began operations in 1828. Both the Pennsylvania Mainline and the Rideau Canals opened in 1834. The peak of canal building occurred in the United States in 1840, and in Canada in the mid 1840s. The time lag between expansion in Britain, on the one hand, and America, on the other, was not a consequence of a time lag in the development of their informational

environments. It reflected the geographical advance of a common informational environment. The frontier of Anglo-American settlement jumped from rivers emptying into the Atlantic south of Nova Scotia to the north shore of the St. Lawrence drainage basin with the migration of the Loyalists in the 1780s. Pushed solely by economic forces, the settlement frontier did not reach the St. Lawrence system until 1800. By 1830 the economic front was beyond the Lower Lakes both to the north and the west, and a contemporary industrial society had been planted in central Canada.

Location and Nature of Industrialization in Canada

Construction of the Chambly Canal on the Richelieu River, at the eastern end of the system, was begun in 1830 and completed in 1843, providing water carriage from the Hudson River and Lake Champlain to the St. Lawrence. The canal was not the basis on which milling was initiated at Chambly, but, as it increased the availability of water power it increased the extent and technical sophistication of milling there. Chambly had been a grain milling center since 1784. By the end of the 1840s the town also had a paper mill and a mechanized cotton mill that produced 800 yards of cloth per day.

At the other end of the system there were three canals: the Grand River, the Burlington, and the Desjardins Canals. All are commonly considered unimportant in accounts of the canal system; and they are unimportant if the importance of the canals is measured, as it has been, by volume of traffic and profits from tolls (Glazebrook, 1964, pp. 72-94. Easterbrook and Aitken, 1956, pp. 254-271). The presence of water power sites at Dundas, just inland from Hamilton, the presence of iron works at Normandale, across the Niagra Peninsula by way of the Welland Canal from Hamilton, and the flow of settlers, goods, and entrepreneurial talent from the Oswego exit of the Erie Canal at the other end of Lake Ontario, all suggest something else. Hamilton surpassed Dundas in size and activity between 1826 and 1832, because the Burlington Bay Canal was opened in 1827, while the Desjardins Canal to Dundas was not completed for another ten years. The Grand River Canal was built by Sir Alan Napier McNabb and his associates in 1832. It was intended to bypass Hamilton and Dundas as centers through which settlers were passing in increasing numbers into what is now South Western Ontario. Neither the Grand River nor the Desjardins Canals were fully operative when railways inland from Hamilton were first projected. The London and Gore Railway and the Hamilton and Port Dover Railway Companies were both incorporated in 1834. Hamilton began its climb into the Railroad Epoch only five years after the first use of steam locomotion in the United States, and only four years after the initial run of Britain's Liverpool and Manchester Railway, the first steam line built for the purpose of carrying passengers as well as goods.

The Industrialization of Hamilton

Much in Hamilton was an importation of the latest techniques from the United States. Joseph Van Norman, for example, migrated from New York in the 1820s to develop iron works at Long Point, not far from the connecting canal that would run from the Grand River Canal to the Welland, and so to the Burlington Canal and Hamilton. His works expanded, selling on both sides of the border (Bliss, 1987, p. 236). Edward and Charles Gurney, iron molders from Utica, New York, moved to Hamilton in 1843. John Fisher and Calvin McQuesten opened a foundry in Hamilton in 1836, using \$2,200 advance by Fisher's cousin, a doctor in Brockport New York. Fisher began by making ploughs, but the principal product of his first year of operations was threshing machinery. The firm used American patterns, but quickly modified their product as experience showed problems. In later years other castings and products were added, notably stoves, wheels, and scales. Iron for the foundry came from Scotland, the United States, and Van Norman's furnaces. Coal came from Pennsylvania, imported through Oswego or Rochester, both on the Erie Canal.

Hamilton's location, the eastern end of Lake Ontario close to a point of relatively easy passage over the Niagara Escarpment, was important in the timing and rate of its development. The nature its development was determined by the nature of the economy close to the frontier of which it was located.

One virtually intangible but critically important determinant of Hamilton's rise as an iron trades centre is the spatial outlook of the Yankee investors and craftsmen who brought foundry enterprises to a bustling town. They saw something in Hamilton's location that can be appreciated best by considering their perception of distances between employment centres and their sense of the direction of continental opportunity. Unlike any other region of Upper Canada, the Niagara and Gore districts presented a virtual extension of the land mass of New York State. The Niagara peninsula ran westward from New York: in fact the exact point where the peninsula connected with New York was close to the Erie Canal. Moreover, the interludes of construction of the Welland Canal, beginning in 1827, helped to fasten New York State entrepreneurial attention onto the Niagara peninsula. Many implications followed from this arrangement of natural land forms and transportation innovations. The Erie Canal collapsed distances within New York State and, in terms of the flow of information, workers and material, the canal compressed the iron trades from Troy to Buffalo. Patterns, labour and pig iron moved readily as did the correspondence which held the iron trades together in a definite network. Technical and personal information moved along the Erie Canal axis as though it comprised

a single village, an impression recommended by the McQuesten-Fisher correspondence during the 1830s. In terms of real distances and steamship connections, Kingston and Toronto were not much more remote from the New York State centres of foundry action than was Hamilton, but there was an important set of supporting psychological considerations that gave a spatial bias to the diffusion of the iron trades. Distance could be a state of mind as much as miles and shipping schedules. Seen from Rochester or Buffalo, Toronto seemed up stream and behind the line that marked the westward thrust of population movement. In the quest for opportunities to supply a growing settlement market, the footloose furnace men, pattern makers and prospective capitalists gazed steadily to the west. The additional facts that Hamilton was on a virtual land extension of New York and that its lack of either a garrison or a government elite made it less overtly British may have reinforced a mental proximity. The cognitive map of North America conceived by many New York foundrymen was one that favoured Hamilton (Weaver, 1981).

The Welland Canal

The Welland Canal was a different matter. In its very beginning it was intended to supply water power to a cluster of industries: a saw mill, a flour mill, a smithy, a potashery, a distillery, and a cooperage. Even the deepening and widening of the canal was planned with a view to more water power for larger mills. (Aitken, 1954). Indeed, in 1830, \$100,000 was offered for the Canal Company's land and water rights. The resulting Hydraulic Company was incorporated, but the \$100,000 was never paid. The Company forfeited its rights to the government for £17,500 when it was found that the use of water for machinery and mills interfered with the working of the canal as a means of transportation.

The Welland was not significant for the large growth of industry using its water power. Rather, it was significant for being an integral part of the expanding North American frontier. Connecting Buffalo with Oswego by way of Lake Ontario, it was built, in part, to compete with the Erie Canal between Buffalo and Albany. The engineers and contractors who built it had worked on the Erie, and most of its capital was drawn from New York. Its organization as a limited liability company was modeled on company organization in New York. In every way it was an extension of the canal systems being built in the United States Midwest, linking the Great Lakes to the Mississippi. Eventually the Welland defaulted into government ownership, but that was not atypical of canals in the United States during the period. Three quarters of the capital for building canals in the United States came from State and municipal governments. "In the early years of the enterprise era [in the United States], state participation in economic growth through mixed enterprises or state

ownership or control, was taken for granted” (Easterbrook, 1990, p. 106).

The Industrialization of Montreal

The canal south of Montreal presents a third picture. Like the Welland Canal, it did not pay for itself by traffic tolls, and it eventually became a public work. Unlike the Welland, however, the Lachine Canal produced water power to support a significant growth of industry.

The first attempt to canal south of Montreal Island was undertaken in the early eighteenth century during the French regime. Following the War of 1812, the need for military transportation induced the government to undertake improvements along the St. Lawrence. In 1817, three small canals, built by the Royal Engineers between 1779 and 1783, were enlarged. Improvements on the Lachine, south of Montreal, first undertaken by a private chartered company, were completed by the government of Lower Canada in 1824. Between 1843 and 1849, the Lachine Canal was deepened to nine feet to accommodate the increasing size of boats on the system.

A variety of industries migrated from Britain and the United States to agglomerate by the Lachine Canal. John Molson was only the outstanding example of a number of craftsmen who established shops that grew to factory status using the water power provided by the canal. There were exceptions. Augustin Couteau, though he learned ship building in New York between 1838 and 1841, was a native Canadian who located close to the canal, not for water power, but for access to river transportation and to build dry dock facilities. Foundries producing steam engines for ships used water power from the canals, but the relationship between steam engines and the canals was complex.

Sailing ships were at a distinct disadvantage on the narrows of any river or inlet. Only a very favorable wind could carry them upstream or along a strait, so navigation of narrows was greatly facilitated by steam power. Indeed, in the beginning it was thought that steam power was only for rivers, canals, and other confined bodies of water. In consequence, steam navigation accompanied the building of canals as the frontier extended inland at the same time in both Canada and the United States. Molson’s steamboat, the *Accommodation*, built in Montreal and powered by a steam engine also built in Montreal, made its maiden voyage in 1809, only two years after the first voyage of the *Clermont* from New York to Albany. It was some time later, in 1815, that the first vessel with a steam engine, the American-built *Savannah*, crossed the Atlantic. The first vessel to cross the Atlantic solely under steam was the Canadian-built *Royal William*, which made the passage in 1833.

The advent of the steam engine and its application in transportation, very much an element in the information environment in Upper Canada, entailed

institutional change. Being larger than the boats towed on the Erie Canal (McCalla, 1993, p. 126), steamships were the occasion of overbuilding of canals with respect to depth and width, and this, in part, accounted for their failure to pay their way in tolls. Overhead costs rose, but competition prevented the tolls from rising as quickly. Further, steam ships were much more expensive than sailing ships, and, accordingly, were financed by shareholders and managed by a committee elected by the shareholders, or by managers in limited partnerships (McCalla, 1993, p. 120). Clearly, then, the forces that brought the limited liability corporation into its full definition in Britain, United States, France and Germany by the mid nineteenth century were equally at work in Canada; and the steam engine was an important element defining the central Canadian economy well before the Railroad Epoch.

In total, the 1841 fleet of thirty-seven vessels represented 1,200 to 1,500 horse power. Such use of steam power suggests that if steam was not more widely used in provincial manufacturing in these years, it was for lack of need, not lack of capital, or knowledge (McCalla, 1993, p. 121) .

Further, given the extensive use of water power in Britain as late as 1870, it would seem that “if steam was not more widely used in provincial manufacturing in these years” conditions in Canada were about the same as those in other industrialized countries.

Water power drawn from the Lachine served a number of purposes. There were machines for barking timber, rollers for leather works, conveyance and lifting devices in foundries making mill gearing, nails, screws, bar iron, bath tubs, and iron pans and kettles. There were carriage factories, confectioners, drug, paint, and linseed oil makers, and manufacturers of rope, newspaper type, soap, and candles (Tulchinsky, 1977; Bliss, 1987; Taylor and Baskerville, 1994), all making use of the water power along the canal.

Evidence of the migration of technology, skilled people, and organization from Britain and the United States is thick on the ground. In 1836, Edward and David Moss, having immigrated from England, set up a clothing factory. By 1856 their company employed 800 people. Water from the Canal powered their sewing machines. The first nail making machine was invented in New England at the end of the eighteenth century. John Bigelow, founder of what became STELCO, using a New England machine, began making nails in Montreal in the 1790s (Kilbourn, 1960, p.5). But the examples in Tulchinsky’s (1977) account of the movement of technology, human capital, and organization from England and the United States to Montreal need not be repeated. The Bank of Montreal, for example, was an 1817 copy of the First Bank of the United States. United States citizens provided virtually half the capital for the Bank’s original 5,000 shares, and employees were sent to the

United States to learn the detail workings of a bank.

Between Montreal and Hamilton

By 1850 there were five canals on the rapids between Montreal and Lake Ontario: the Beauharnois, at Valleyfield just upstream from the Lachine; and four others between Cornwall and Prescott. All were completed in the 1840s as part of the Imperial plan to unite the Canadas. The Cornwall Canal, initiated in the 1830s as a public work supported by business interests in Brockville was an effect of steam navigation (Macpherson, 1981). Steam navigation enlivened all the towns along the Rideau and the St. Lawrence: Kingston, Brockville, Perth, and Smiths Falls. All wanted to capture the trade between Montreal and Lake Ontario. All expanded in the 1830s with new buildings and foundries, and all experienced the merging of interests to build steam boats (Macpherson, 1981, pp 44-47). In the end the traffic largely passed them by, as it would again following another spurt of growth with the coming of the railroads. Still, some growth and development took place, and all remained centers of some importance to the economy of Southern Ontario.

Toronto was not on a canal, and was not a “manufacturing town”, though the manufacturing that it had did not lag badly behind that of Montreal or Hamilton, either in what was made or in technical sophistication (Masters, 1947, p. 15). York began in 1793 as the chosen location for a military and government center. It grew as a political capital and as a commercial and financial center for agricultural settlement advancing north towards Georgian Bay. In particular, the upsurge in immigration from Britain after the War of 1812 gave it a large, captured back country, adding to the effects of Canal Era advance in transportation and industry . With the advent of canals and steam boats Toronto’s connections with New York, by way of the Erie, other ports on the lower lakes, and Montreal expanded the reach of its import, wholesale, and export business. Its connections with the canal system of the Northeastern and Midwestern United States contributed to its liberation from the financial and commercial hegemony of Montreal, especially after the United States Draw Back Act of 1845 permitted tariff free passage of Upper Canadian Goods through to New York. Bulk wheat, flour, and potash continued to be carried by the more loosely scheduled sailing ships, but, by 1826, most passengers and communications used the five steamboats servicing York’s connections with other centers on the Lower Lakes (Glazebrook, 1971 p. 54). Toronto’s elite was British, but a strong United States influence in its information environment was expressed in the reform movement that led to the rebellion in 1837.

Toronto developed at the same pace as the rest of North America. In 1847, only three years after the first use of the telegraph in the United States, indeed, in the world, Toronto had direct telegraph connections with the growing United States system and with Montreal (McCalla, 1993, p. 137).

The Organization of Labor

Canal Era industrialization entailed new technology, new business organization, and also new forms of labor organization. According to the radical left historian, Leo Johnson (1983),

The Reform vision [of 1837] looked with increasing horror at the social implication of the industrial revolution and the creation of a degraded working class which was foreseen in the expansion of large scale capitalism to Upper Canada (Philips, 1981, p. xxix).

Johnson's depiction may be an exaggeration, but Clare Pentland (1981) and Stanley Ryerson (1963) also dated the formation of an industrial labor market in Canada from the mid point of the Canal Era. Charles Lipton's account of the birth of the trade union movement (1966) is more telling. Lipton not only chronicles the arrival of the unions, he describes them. Most often they were journeymen associations, organized against master craftsmen: tailors, printers, bricklayers, shoemakers, and carpenters. Industrialization in Canada, as in Britain and the United States, was constituted by the expansion of small shops. Enterprising worker-owners became employers and overseers, applying new machine technologies in factory-like operations.

The Information Environment

The press, newspapers, pamphlets and books, had a late start in Canada because Europe's frontier arrived late. When expansion of weeklies and dailies made their mark in eighteenth century Britain (Innis, 1951), everything west of Montreal, and much about Montreal was still virgin forest. When Europe's frontier arrived in the early nineteenth century Canada, however, it arrived already matured to the point it had reached in Britain and the United States. It brought with it the information and mentality of contemporary Euro-American civilization.

[A printing and publishing] sector of the provincial economy, which began to take shape in the 1820s and 1830s, was already focused at Toronto. John Macaulay listed thirty-six newspapers published in Upper Canada in 1841, eight of which had survived for ten years or more. No fewer than twelve newspapers were published at Toronto. The industry expanded rapidly in the 1830s and 1840s, six papers being established in 1836 alone. By 1845 W.H. Smith counted forty seven newspapers, ten in Toronto. Except for those at Berlin and Sandwich, all the 1845 newspapers were located in communities with a population of 1,000 or more, and just six such towns ... did not have a newspaper (McCalla, 1993, p. 111) .

The number of newspapers and their location does not tell the whole story.

Some 425,000 issues of newspapers circulated through the mails in 1836, among a population of 370,000 in Upper Canada. Almost half originated in the United States or elsewhere outside of Canada (McNairn, 2000, pp. 126-127). Upper Canadians were literate. Some 80 percent of Upper Canadian adults could read and write, compared to about 60 percent in Britain's population (McNairn, 2000, p. 133).

Reading made a difference. The commercial news room located upstairs in the Market Building in Toronto carried sixty-two periodicals: forty nine newspapers, all ten Toronto papers, and ten from elsewhere in Canada, ten from London, and five from elsewhere in Britain, several from New York City, and seven from elsewhere in the United States (McNairn, 2000, pp. 145-46). Besides the reading commercial elite, there were, as in the United States and Britain, historical, literary, debating, and agricultural societies, about two dozen Mechanics Institutes, and some temperance societies, all of which fed off circulating printed matter from the United States and Britain. Freemasons, professing the liberalism of the period and honoring their connection with lodges in the United States accounted for 57 of the 283 who served as members of the colonial assembly before 1841 (McNairn, 2000, p. 80; Pentland, 1981, pp 176 ff).

Much of the information carried in the press was technical. The *Canada Constellation*, the *Niagara Herald*, the *Kingston Gazette*, and even the *Upper Canada Gazette* devoted a great deal of space to articles on planting and harvesting. Most of these were taken from a wide selection of American publications and from the papers of a variety of American agricultural societies. In America as in Britain, the application of science in agriculture advanced *pari passus* with the application of science in other categories of economic activity. In both cases the phenomenon was an element in a new mentality that had pervasive consequences. In central Canada the new mentality in the form of "Public opinion" became a significant force as the "development of capitalism" contributed to a "deep structural change" in politics (McNairn, 2000, p. 16, n 24; p. 19).

The American Frontier in Canada

Lord Durham reported that

The influence of the United States surrounds [the Canadian] on every side, and is forever present. It extends itself as population augments and intercourse increases, it penetrates every portion of the continent into which the restless spirit of American speculation impels the settlers or the trader, it is felt in all the transactions of commerce, from the important operations of the monetary system down to the minor details of ordinary traffic, it stamps on all the habits and

opinions of the surrounding countries, the common characteristics of the thoughts, feelings, and customs of the American people (Easterbrook and Watkins, 1984, pp. 127-128).

Outstanding examples of the immediate transfer of industry with the incursion of the American frontier into Canada have been documented by Merrill Denison (1948) and A.R.M. Lower(1973).

David Massey arrived in Canada from New York in 1800. His son, David junior, returned to Watertown, New York for schooling and to solidify family relations, and, indeed, to bring back his bride. In 1830, the younger David, again visited Watertown, this time bringing back a threshing machine. He immediately set up a shop to produce them in Upper Canada. But technology transfer occurred both by way of the United States and directly from Britain. The Scot, Patrick Bell, who invented a forerunner of the reaper, another of the new horse drawn implements, spent four years in Canada, between 1832 and 1837, carrying with him a scale model of his machine. The first commercially viable reaper, the McCormack, was produced in the United States, in 1831, during Bell's visit to Canada. Evidently, in the Canal Era, invention, innovation, and production of advanced agricultural implements was a common phenomenon everywhere in the Euro-American reach of English speaking populations.

With the opening of the Erie (1824), the Rideau (1832), and the Welland (1829) Canals, it became profitable to use steamships to tow timber rafts on the Great Lakes. As a consequence forest products began to flow to Kingston from Western Ontario and the Ottawa Valley, and from there, by way of Oswego, to New York (Lower, 112).

[I]t was left to a Yankee lumberman out of New York ... to seize the strategic moment when steam technology made rafting on the Great Lakes feasible. Delano Dexter Calvin moved his small St. Lawrence rafting business upstream to the Canadian side in the late 1830s (Bliss, 1987, p. 139).

In this last example, in particular, it is evident that the advance of technology in the first industrial revolution facilitated both the export of primary products and the growth of manufacturing, *pari passus*. The picture with which we are left is one of staple exports and manufacturing emerging from a common information environment; not one of staple exports preceding in time, and manufacturing following with a lag depending on the strength of forward and backward linkages.

Canal Era Industrialization in Canada

It is not only, and perhaps not primarily, developments at Montreal and Hamilton that show early nineteenth century central Canada to have experienced the first industrial revolution. In Britain during the Canal Era, industry was rural, rather than urban. Larger centers generally depended on commerce rather than manufacturing (Ashton, pp. 48-49); and so it was in the territory north of the St. Lawrence canal system. Toronto's presence in York County had no effect on the size and number of manufacturing establishments in that county in a comparison with other counties (Spelt, 1972, p. 76).

The census of 1851 recorded 61 steam grist and saw mills in South Central Ontario. Of those only 55% were situated in townships bordering on Lake Ontario, which had 69 percent of the places with more than 200 inhabitants in the region. On the other hand 45 percent of the steam mills were found in the inland townships, which had only 31 percent of the larger centers (Spelt, 1972, p. 76).

It is interesting, of course, that this diffusion of steam power throughout "South Central Ontario" took place when the most common power unit in Britain was still the water wheel.

Canal Era industrialization occurred in Canada as in Britain and the United States. Indeed, it defined the nature of the frontier in Canada, because that frontier expanded with the energy and instruments that facilitated industrialization. Increasing division of labor in globalizing Euro-American civilization, and the smaller population and larger area of Canada, determined that the Canadian frontier was relatively dependent on primary product exports. Even in its specialization, however, it was impregnated with the information environment, the technical, human and institutional capital of the informational revolution at the base of industrialization. The Canal Era in Canada, in all its important characteristics, was a contemporary extension of "the first industrial revolution" in Britain and the United States.

Notes:

(1) Of course, this statement depends on whose characterization is in question. The traditional view is that of F.J. Turner, and of W.A. Mackintosh, H.A. Innis, and V.C. Fowke who attempted to draw or not to draw from Turner a paradigm of Canadian economic development. N.S.B. Gras, on the other hand, held a view different from that of Turner. It is this different view that is consistent with the view presented here. "The Atlantic is broad, but there is no ocean of difference between the social development of Europe and that of America." (*A History of Agriculture in Europe*

and America, Chapter XI, “History of Property in Land”, pp. 252-283, p. 252.).

(2) Failure to make this distinction lies at the root of an unresolved controversy between A.W. Niemi and R.L. Ranson concerning the degree of specialization and self sufficiency on the Atlantic seaboard and in the Midwestern states of the United states in the Canal Era. (See *Explorations in Economic History*, vols. 7-9, 1970-1972.) More to the point, failure to make this distinction lies at the root of the repeated attempts to determine whether Canada has depended on exports to generate development, or development to generate exports. (See T.O. Awokuse, “Is the Export-led Growth Hypothesis Valid for Canada?”, *Canadian Journal of Economics*, vol. 36, 2003). Mokyr (1999, pp. 67-75) has made this distinction with respect to industrialization in continental Europe, adding that military activity after 1890 did much to prevent the economic consequences of the revolution there.

(3) Excellent reviews of the literature can be found in Pollard (1996) and Mokyr, (1999).

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